PATENT CLAIMS

1. A circuit-breaker, which has at least one arcing chamber which is filled with an isolating gas, extends along a longitudinal axis (1), is designed to be essentially radially symmetrical, contains an arc area and has at least two power contact pieces, with at least one of the power contact pieces being in the form of a moving or stationary tubular hollow contact (2), which is provided for dissipating hot gases from the arc area into an exhaust volume (10), having a deflection device (4), which is arranged on the side of the hollow contact (2) facing away from the arc area, interacts with at least one first opening (6) in the hollow contact (2) and is connected to a connecting piece (12), for the radial deflection of the hot gases into the exhaust volume (10), which is connected through at least one second opening (13) to an arcing chamber volume (14), with at least one first intermediate volume (7) being provided between the hollow contact (2) and the exhaust volume (10), characterized - in that the following ratios are complied with:

V_1/A_1 = (0.1 to 0.5) m,

V_2/A_2 = (0.1 to 0.5) m,

V_3/A_3 = (1.0 to 2.5) m,

where: V_1 is the volume within the hollow contact (2) and A_1 is the cross section of the first opening (6), V_2 is the volume of the first intermediate volume (7) and A_2 is the cross section of the third opening (9), V_3 is the volume of the exhaust volume (10) and A_3 is the cross section of the second opening (13).

2. The circuit-breaker as claimed in claim 1, characterized - in that the at least one first intermediate volume (7) is arranged in a stationary fixed manner in the exhaust volume (10) and this is arranged in a stationary fixed

manner in the interior of an arcing chamber isolator (15) which bounds the arcing chamber volume (14), with the hollow contact (2) being movable together with the connecting piece (12) relatively to them.

3. The circuit-breaker as claimed in claim 1, characterized
- in that the at least one first intermediate volume (7) is firmly connected to the hollow contact (2) and to the connecting piece (12), and can move together with them through the exhaust volume (10), which is arranged such that it is stationary, relative to the exhaust volume (10).

4. The circuit-breaker as claimed in claim 1, characterized
- in that the at least one first intermediate volume (7) is firmly connected to the hollow contact (2), to the connecting piece (12) and to the exhaust volume (10), and can move together with them through the arcing chamber volume (14), relative to the arcing chamber volume (14).

5. The circuit-breaker as claimed in one of claims 1 to 4, characterized
- in that the at least one first intermediate volume (7) is arranged concentrically with respect to the deflection device (4),
- in that the at least one first intermediate volume (7) is bounded from the exhaust volume (10) by a first wall (8),
- in that the first wall (8) has at least one third, radially aligned opening (9), which connects the intermediate volume (7) to the exhaust volume (10), and
- in that the first wall (8) is composed of a highly thermally conductive material, in particular of a metal or of a plastic which can evaporate.

6. The circuit-breaker as claimed in one of claims 1 to 5, characterized

- in that at least one second intermediate volume, which is referred to as an additional volume (16), is provided between the first intermediate volume (7) and the exhaust volume (10), and
- in that this additional volume (16) is preferably arranged concentrically.

7. The circuit-breaker as claimed in claim 6, characterized

- in that the at least one additional volume (16) is bounded from the intermediate volume (7) by the first wall (8) and from the exhaust volume (10) by a second wall (17),
- in that the second wall (17) has at least one fourth, radially aligned opening (18), which connects the additional volume (16) to the exhaust volume (10), and
- in that the second wall (17) is composed of a highly thermally conductive material, in particular of a metal or of a plastic which can evaporate.

8. The circuit-breaker as claimed in claim 7, characterized

- in that the following ratios are complied with:

$$V_1/A_1 = (0.1 \text{ to } 0.5)\ m,$$
$$V_2/A_2 = (0.1 \text{ to } 0.5)\ m,$$
$$V_3/A_3 = (1.0 \text{ to } 2.5)\ m, \text{ and}$$
$$V_3/A_3 \geq V_4/A_4 \geq V_2/A_2,$$

where: V_1 is the volume within the hollow contact (2) and A_1 is the cross section of the first opening (6), V_2 is the volume of the first intermediate volume (7) and A_2 is the cross section of the third opening (9), V_3 is the volume of the exhaust volume (10) and A_3 is the cross section of the second opening (13), V_4 is the volume of the additional volume (16) and A_4 is the cross section of the fourth opening (18).

9. The circuit-breaker as claimed in one of claims 5 to 8, characterized

- in that the at least one first opening (6) is offset on the circumference with respect to the at least one third opening (9), such that it is not possible for the hot gases to flow in a straight line in the radial direction through the intermediate volume (7).

10. The circuit-breaker as claimed in one of claims 5 to 8, characterized

- in that the at least one first opening (6) is arranged at the circumference with respect to the at least one third opening (9) such that at least some of the hot gases can flow in a straight line in the radial direction through the intermediate volume (7).

11. The circuit-breaker as claimed in one of claims 6 to 10, characterized

- in that the at least one fourth opening (18) is offset at the circumference and/or in the axial direction with respect to the at least one third opening (9) such that it is not possible for the hot gases to flow in a straight line in the radial direction through the additional volume (16).

12. The circuit-breaker as claimed in one of claims 6 to 10, characterized

- in that the at least one fourth opening (18) is arranged with respect to the at least one third opening (9) such that at least some of the hot gases can flow in a straight line in the radial direction through the additional volume (16).

13. The circuit-breaker as claimed in claim 1, characterized
- in that the volume V_1 within the hollow contact (2) is 0.33 liters and the cross section A_1 of the first opening (6) is 1 850 square millimeters,
- in that the volume V_2 of the intermediate volume (7) is 0.7 liters and the cross section A_2 of the third opening (9) is 3 800 square millimeters, and
- in that the volume V_3 of the exhaust volume (10) is 8 liters and the cross section A_3 of the second opening (13) is 4 000 square millimeters.

14. The circuit-breaker as claimed in claim 8, characterized
- in that the opening (9) is closed by a shutter which has a large number of holes (9a, 9b, etc.).

15. The circuit-breaker as claimed in claim 14, characterized
- in that a vertical distance H is provided between the outer face of the wall (8) and the inner face of the wall (11) opposite it,
- in that the holes (9a, 9b, etc.) each have a diameter D, and
- in that the ratio H/D is intended to be in the range from 5 to 1.5.

16. The circuit-breaker as claimed in claim 15, characterized
- in that an axial distance S is provided between the centers of the holes (9a, 9b, etc.) and is defined by the following relationship:

$$S = 1.4 \times H .$$

17. The circuit-breaker as claimed in one of claims 14 to 16, characterized
- in that the holes(9a, 9b, etc.) have inclined side walls (27), such that the holes (9a, 9b, etc.) widen in the flow direction of the hot gas.

18. The circuit-breaker as claimed in claim 17, characterized
- in that the side walls (27) of the widening holes (9a, 9b, etc.) are at an angle in the range from 35° to 50°, but are preferably at an angle of 45°, with respect to the longitudinal axis of the holes (9a, 9b, etc.).

19. The circuit-breaker as claimed in one of claims 16 to 18, characterized
- in that further holes, which are shifted at the circumference with respect to the holes (9a, 9b, etc.), are arranged such that the impact points of the gas jets flowing through the holes on the opposite wall are separated by the distance S all round.

20. The circuit-breaker as claimed in claim 1, characterized
- in that the at least one intermediate volume (7) is designed such that it can be installed retrospectively in circuit-breakers which are already in operation.

(Figure 1)